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REMARKS

The Applicants would like to thank the Examiner for review of the present application and the attention given in the resulting office action. Claims 1-6,8-12,14-15,17-18 and 20 were rejected under 35 USC 103(a) as being unpatentable over Kulischenko et al (4,398,173) in view of Koyo Seiko. Claims 7,16 and 19 were rejected under 35 USC 103(a) as being unpatentable over Kulishchenko in view of Serizawa (5,347,458).

The Applicant respectfully traverses the Examiner's rejections and requests reconsideration in light of the aforementioned amendments when taken into consideration alongside the following arguments.

Claims 1-6,8-12,14-15,17-18 and 20 rejected under 35 USC 103(a)

Claims 1-6,8-12,14-15,17-18 and 20 were rejected under 35 USC 103(a) as being unpatentable over Kulischenko et al (4,398,173) in view of Koyo Seiko. The Applicant respectfully traverses this rejection and requests reconsideration.

The central tenant of the present invention is the use of a flexible steering shaft that is fixed on one end and has a steering wheel at the other. As the steering wheel is rotated, the flexible shaft twists which can be utilized to impart feel as well as be used in combination of electronic measuring components to judge how far the wheel has been turned and thereby used in a steer-by-wire system.

None of the cited references, either alone or in combination, teach or even come close to suggesting any such combination. The "flexible shaft" utilized in the Kulishcenko reference is only flexible in that it can absorb impact energy. It experiences extremely minimal twist as it is utilized, and this is precisely because its primary purpose is to transfer torque through it. The flexible shaft of the present invention has the purpose only to twist... there is no where to transfer the torque to as it is fixed on the other end. Thus the structure in the reference functions in a drastically different way for a drastically different purpose. It cannot be utilized to render the present

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invention obvious as it teaches away from the claimed combination of limitations. Furthermore, even the use of electronic strips to measure strain in the Kulischenko reference are used to make sure that any significant twisting does not happen or failure would occur. This is because the reference utilizes the shaft to transfer torque, not solely to twist as claimed by the present invention.

Furthermore, the Applicant could not find a reliable date for the Seiko reference. The Applicant assumes the Examiner is going by the 1998 copyright date on the web site. In any case, the Seiko simply teaches the generic drive-by-wire system. No combination of these references could arrive at the present invention. The very concept of measurement of purposely induced twist for use in steer by wire is not contemplated by either disclosure. The mere use of the similar adjective "flexible" fails to rise the references into the category of interchangeable with elements of the present invention. All the cited structural connection references are designed to reliably transfer torque from one end of the shaft to the other. Only the present invention contemplates using the torque to generate twist in the shaft and to measure such twist.

Also, the specification and claims specifically discuss and claim adjusting the modulus and mechanical properties of the flexible polymer steering shaft by the introduction of current. The Applicant strenuously disagrees and traverses the Examiners assertion that merely running current in reverse to the sensors in Kulischenko would alter the modulus. The steering column in Kulishenko is a series of tightly wound metal springs. The Applicant is assured that reversing the current to the sensors in Kulishenko would have virtually no effect on modulus. Furthermore, as Kulishenko is designed to transfer rotational torque, not absorb it through internal twisting, there would be absolutely no point in modifying the modulus even were it possible. Therefore, the Applicant respectfully traverses this rejection.

The Applicant traverses the mere dismissal of the flexible polymer as well. The Applicant is claiming a simulated steering assembly with one end Fixed. None of the cited reference teaches this. Seiko and all others rely on the rotation of the steering

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column. The present invention alone relies and claims the TWIST of the steering column. Seiko rotates both ends, one just rotates measurement gears and pulleys. This is not FIXED in a mechanical definition.

Claims 7,16 and 19 rejected under 35 USC 103(a)

Claims 7,16 and 19 were rejected under 35 USC 103(a) as being unpatentable over Kulishchenko in view of Serizawa (5,347,458). The Applicant respectfully incorporates the traversal of the Kulishchenko reference and seeks reconsideration. The Applicant further asserts that while the concept of imparting road feel to drive by wire systems is not novel (Serizawa), that the imparting of such feelings by way of altering the modal resonances of a flexible polymer shaft by introduction of current is not taught in any of the cited references. Serizawas does not teach, contemplate, discuss, or even hint at any such mechanical structure. The cited portion of Serizawa simply discusses removal of physical connection in steer by wire systems. This is far afield from teaching the physical limitations of the present claimed invention. The Applicant therefore transverses the Examiners rejection and requests reconsideration.

CONCLUSION

The Applicants would like to thank the Examiner for his assistance. In light of the above amendments and remarks, Applicants submit that all objections and rejections are now overcome. Applicants have added no new material to the application by these amendments. The application is now in condition for allowance and expeditious notice thereof is earnestly solicited.

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Should the Examiner have any questions or comments that would place the application in better condition for allowance, the Examiner is respectfully requested to call the undersigned attorney.

Respectfully submitted,



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Dated: December 22, 2005